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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/750,036	12/29/2000	Suk-Joong Lee	P 275438 P00H9025/US	6463
909	7590	01/30/2004	EXAMINER	
PILLSBURY WINTHROP, LLP P.O. BOX 10500 MCLEAN, VA 22102			SIANGCHIN, KEVIN	
		ART UNIT	PAPER NUMBER	
		2623	7	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/750,036	LEE ET AL.
	Examiner Kevin Siangchin	Art Unit 2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ~~1/16~~ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION. *3/4/01*

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-16 is/are pending in the application.
 - 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) Claim(s) ____ is/are allowed.
- 6) Claim(s) 1-16 is/are rejected.
- 7) Claim(s) ____ is/are objected to.
- 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 29 December 2000 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some
 - c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. ____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.
- 13) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 - a) The translation of the foreign language provisional application has been received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ . | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

Drawings

1. The drawings are objected to because:
 - a. The equations in Fig. 4, reference number 150, while being mathematically valid expressions for R_q , G_q , and B_q , do not correspond the way in which the applicant determines R_q , G_q , and B_q (see page 7, lines 15-17 in the applicant's disclosure). There it is implied that R_q , G_q , and B_q are the integer portions of the quotient, obtained by the division R_n/LossV , G_n/LossV , and B_n/LossV , respectively, and that R_{res} , G_{res} , and B_{res} are the remainders of the respective divisions. Fig. 4, reference number 150 implies that R_{res} , G_{res} , and B_{res} are known prior to step 150. This is not shown in Fig. 4.
 - b. Fig. 5A contains Korean symbols.
 - c. It is unclear from the specification as to why, in the successive steps or the applicant's algorithm, $(R\text{diff_ver}, G\text{diff_ver}, B\text{diff_ver})$ and (R_n, G_n, B_n) take on the values of (R_q, G_q, B_q) (cf. Fig. 5c and Fig. 5d).
 - d. On page 2, line 2 of the applicant's disclosure, a reference is made to a R/G/B extraction unit 22. Such a unit is not shown in the figures.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: R/G/B extraction unit 22. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities.
 - a. Throughout the specification, the applicant refers to *quota color values*. It is not clear from the disclosure what is meant by the designation, *quota*. Referring to these color values as *quotient color values* seems to be more appropriate.
 - b. A closing parenthesis is missing on page 7, line 10.

Appropriate correction is required.

Claims

Objections

4. Claims 1-16 are objected to because of the following informalities.
 - a. The applicant refers to *quota color values* (e.g. claims 1, 6, 9, and 14). It is not clear from the disclosure what is meant by the designation, *quota*. Referring to these color values as *quotient color values* seems to be more appropriate. This will be the convention followed in the remainder of this document.
 - b. The lines referred to in the claims should be specified as horizontal lines, as suggested in the applicant's specification and figures.

Appropriate correction is required.

Rejections Under U.S.C. § 112(2)

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
6. Claims 3, 6-7, 11, and 14-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. *The following is in regard to claims 3 and 11.* These claims state, “before (c): adding remainder color values obtained from (c) to the vertical difference values”. This is clearly a fallacious statement since it requires one to accept the addition of a remainder color value obtained from performing (c) prior to performing (c). In the remainder of this document, it assumed that the applicant intended this phrase to read as, “before (c): adding remainder color values obtained previously from (c) to the vertical difference values” or “before (c): adding a previous remainder color values obtained from (c) to the vertical difference values”.

8. *The following is in regard to claims 6 and 14.* These claims list two steps labeled (e). It is, therefore unclear as to whether these steps are distinct or represent the same step. To rectify this ambiguity, it suggested labeling the latter of these as (f). Claims 7-8 and 15-16 should then be changed accordingly.

9. *The following is in regard to claims 7 and 15.* Since claim 6 and 14, respectively, list two steps labeled (e), it cannot be determined in phrase “repeating (a) to (e)”, found in claims 7 and 15, as to which of the two steps labeled (e) the applicant is referring. This renders claims 7 and 15 unclear. It assumed in the remainder of this document that the applicant intended that the phrase, “repeating (a) to (e)”, refer to the former of the two steps labeled (e).

Rejections Under U.S.C. § 103(a)

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant’s admitted prior art as described in the *General Background and Related Art* on pages 1-4 in the applicant’s disclosure (hereinafter, Prior Art), in view of Houle (U.S. Patent 5,710,719).

12. *The following is in regard to claim 1.* Prior Art discloses a method of compressing image data fed from an image sensor having a color pixel array (e.g. Prior Art, page 2, lines 1-3). The method comprises:

- a. Extracting red, green and blue (R/G/B) color values from the image data (e.g. Prior Art, page 2, lines 1-2);
- c. Dividing the (R/G/B) color values of the current line with a predetermined loss value to obtain quotient color values (Prior Art, page 3, lines 5-7 and Fig. 1, reference number 66);
- d. Estimating horizontal difference color values between a current quota color value and a previous quota color value (Prior Art, page 3, lines 7-9 and Fig. 1, reference number 68);
- e. Coding the horizontal difference values (e.g. VLC described in Prior Art, page 2, paragraph 1).

13. Prior Art, however, does not disclose (b) calculating vertical difference color values between current R/G/B color values of a current line and previous R/G/B color values of a previous line. Houle discloses a method for compressing 2D image data wherein the image data is encoded using DPCM (Houle column 14, lines 1-9). A DPCM algorithm employed calculates the vertical difference color values between current R/G/B color values of a current line and previous R/G/B color values of a previous line (Houle column 14, lines 10-33 – note, in particular, equation [1]). The pixels are then further compressed (Houle column 14, lines 34-35). This is analogous to step (b) in applicant's claim 1.

14. Houle demonstrates that performing DPCM vertically can be incorporated into a compression algorithm. Furthermore, as indicated by Houle (Houle column 14, lines 5-7), using DPCM, in this manner, advantageously reduces the compressed size of the image, because most pixel values are transformed into a set of small deltas. Given the demonstrated compatibility of DPCM with other compression schemes and the clear advantage of incorporating DPCM into such schemes, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to perform Houle's DPCM (i.e. calculating vertical difference color values between current R/G/B color values of a current line and previous R/G/B color values of a previous line), thereby obtaining color values that are vertical difference color values (i.e. the [Rnow,Bnow,Gnow] of steps 64 become vertical difference color values, as opposed to , the [R/G/B] color values of the current line) and to further compress these values by performing steps (c)-(e) of the compression method described in Prior Art. In combining the

teachings of Prior Art and Houle, in the manner just described, one would obtain a method of compressing image data fed from an image sensor having a color pixel array, in accordance with claim 1.

15. *The following is in regard to claim 2.* Note that the step put forth in claim 2 clearly follows from claim 1 since, a first line has no previous line with which to calculate vertical difference color values between current R/G/B color values of the first (i.e. current) line and previous R/G/B color values of a previous line. Therefore, given the discussion above with regard to claim 1, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to not calculate vertical difference color values between current R/G/B color values of the first (i.e. current) line and previous R/G/B color values of a previous line (hereinafter, step (b)), and simply proceed to step (c) above.

16. *The following is in regard to claim 3.* Taking into account the discussion above, with regard to claims 1 and 2, and Prior Art page 3, lines 24-26 to page 4, line 1 and Fig. 1, reference number 64, it should be clear that by incorporating the DPCM of Houle into the compression method of Prior Art, would result in a method, in accordance with claims 1 or 2, further including: before the step of dividing the vertical difference color values with a predetermined loss value to obtain quota color values (i.e. step (c) of claim 1), adding previous remainder color values, obtained from this step, to the vertical difference color values. Thus the teachings of Houle and Prior Art, when combined in the manner described above, with respect to claims 1 and 2, address all aspects of claim 3.

17. *The following is in regard to claim 4.* The compression method, disclosed in Prior Art, is directed toward Bayer Pattern color pixel arrays (Prior Art, page 1, lines 24-25). In this regard, the teachings of Houle and Prior Art, when combined in the manner described above, with respect to claims 1 and 2, address all aspects of claim 4.

18. *The following is in regard to claim 5.* Prior Art shows repeating steps (a), (c) and (d) above during one line of the color pixel array and initializing the previous R/G/B color values after completing one line of the color pixel array. See Prior Art Fig. 1 and Prior Art, page 2 lines 25-26 and page 3, lines 12-16. However, Houle suggests repeating the step of performing DPCM (i.e. step (b)), per row. See Houle column 25, lines 7-10. Given this, it would be obvious to one of ordinary skill in the art to repeat steps (a), (b), (c), and (d) above. In doing so, one would obtain a compression method, in accordance with claim 1, further comprising repeating steps (a), (b), (c) and (d) above during one line of the color pixel array and initializing the previous R/G/B color values after completing one line of the color pixel array.

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19. *The following is in regard to claim 6.* Prior Art discloses a method for compressing image data fed from an image sensor having a color pixel array (e.g. Prior Art, page 2, lines 1-3), comprising:

- a. Extracting red, green and blue(R/G/B) color values from the image data (e.g. Prior Art, page 2, lines 1-2);
- c. Adding the R/G/B color values of the current line with previous R/G/B remainder color values to obtain added color values (Prior Art page 3, lines 24-26 to page 4, line 1 and Fig. 1, reference number 64);
- d. Dividing the added color values with a predetermined loss value to generate current R/G/B quotient color values and current R/G/B remainder color values (Prior Art, page 3, lines 5-7 and Fig. 1, reference number 66);
- e. Estimating horizontal difference values between the current R/G/B quotient color values and previous R/G/B quotient color values (Prior Art, page 3, lines 7-9 and Fig. 1, reference number 68);
- f. Coding the horizontal difference values (e.g. VLC described in Prior Art, page 2, paragraph 1).

Prior Art, however does not show (b) calculating vertical difference values between current R/G/B color values of a current line and previous R/G/B color values of a previous line, respectively, nor that the R/G/B color values of the current line in step (c) above should be vertical difference values, as in step (c) of claim 1.

20. Houle discloses a method for compressing 2D image data wherein the image data is encoded using DPCM (Houle column 14, lines 1-9). A DPCM algorithm employed calculates the vertical difference color values between current R/G/B color values of a current line and previous R/G/B color values of a previous line (Houle column 14, lines 10-33 – note, in particular, equation [1]). The pixels are then further compressed (Houle column 14, lines 34-35). This is analogous to step (b) in claim 1 in applicant's claim 1. Houle's DPCM can be incorporated into the method of compression taught by Prior Art in the same manner as shown above for claim 1. Therefore, in an a similar manner as described above with respect to claim 1, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to perform Houle's and to further compress these values by performing steps (c)-(f) of the compression method described in Prior Art. It should be understood that, as in claim 1, by performing step (b) (i.e. Houle's DPCM), the R/G/B color values of the current line would be vertical

difference values and step (c) above would, thereby, become adding the vertical difference values with previous R/G/B remainder color values to obtain added color values. It is thus been shown that the teachings of Prior Art and Houle, when combined in the manner just described, address all aspects of claim 6.

21. *The following is in regard to claim 7.* Prior Art shows repeating steps (a), (c), (d), and (e) above during one line of the color pixel array and initializing the previous R/G/B color values after completing one line of the color pixel array. See Prior Art Fig. 1 and Prior Art, page 2 lines 25-26 and page 3, lines 12-16. However, Houle suggests repeating the step of performing DPCM (i.e. step (b)), per row. See Houle column 25, lines 7-10. Given this, it would be obvious to one of ordinary skill in the art to repeat steps (a)-(e) above. In doing so, one would obtain a compression method, in accordance with claim 6, further comprising repeating steps (a)-(e) above during one line of the color pixel array and initializing the previous R/G/B color values after completing one line of the color pixel array.

22. *The following is in regard to claim 8.* Note that claim 8 is trivial since, clearly, a first line has no previous line with which to calculate vertical difference color values between current R/G/B color values of the first (i.e. current) line and previous R/G/B color values of a previous line. Therefore, given the discussion above with regard to claim 6, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to perform step (b) above, and simply proceed to step (c) above.

23. *The following is in regard to claims 9-16.* These claims recite substantially the same limitations as claims 1-8, respectively. Therefore, with regard to claims 9-16, remarks analogous to those presented above with respect to claims 1-8 are respectively applicable.

Citation of Relevant Prior Art

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- U.S. Patents 4,295,167 (Wiggins) and U.S. Patent 5,821,986 (Yuan et al.).* These patents demonstrate DPCM encoding along vertical or horizontal lines within an image, in a manner similar to Houle, where the difference is taken between a current pixel and a previous pixel along the same line.

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- b. *U.S. Patent 6,055,017 (Shen et al.).* Shen et al. show vertical DPCM for a horizontal band of pixels and horizontal DPCM for a vertical band of pixels and the subsequent coding of the derived difference data.
- c. *U.S. Patent 6,614,483 (Lee et al.).* Lee et al., the current applicants, show the compression method described in Prior Art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Siangchin whose telephone number is (703)308-6604. The examiner can normally be reached on 9:00am - 5:30pm, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)306-0377.

Kevin Siangchin

ks.

Examiner
Art Unit 2623

ks- 01/24/04



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